FPF-IDRC PROJECT ON
INFANT MORTALITY IN RELATION TO FERTILITY

REPORT ON

HILLY AND RURAL AREAS OF

UTTAR PRADESH

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M S ASRAF

GIRI INSTITUTE OF
DEVELOPMENT STUDIES
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STUDY ON INFANT MORTALITY
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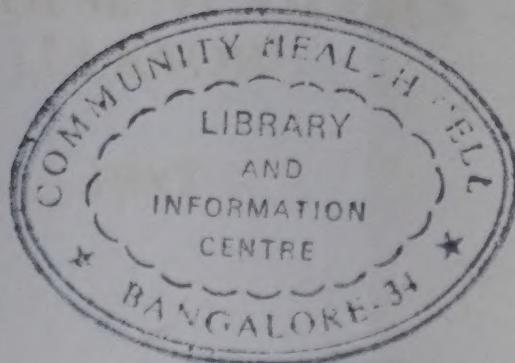# HILLY AND RURAL AREAS OF
UTTAR PRADESH

Giri Institute of Development Studies
Lucknow.

CHAPTER-I

INTRODUCTION

Uttar Pradesh with 1109 lakh persons (1981) has the highest population among the states accounting for about one-sixth of total population of India. It ranks fourth in the area with 2.94 lakh sq.km. The density of population, per sq.km. is 377. About 82 per cent of total population of the state lives in rural areas comprising 1,12,566 villages while about 18 per cent in the 659 urban areas. The sex ratio (number of females per 1000 males) in U.P. is one of the lowest (885) among the major states. The decadal growth rate ((1971-81) was 25.49.

According to the census 1981 the literacy rate in the state was 27.16, 38.76 per cent among males and 14.04 per cent among females. In the rural-urban settings 23.34 per cent of the population in the rural areas was literate as compared to 45.91 per cent in the urban areas. Literacy among females has been very low in the rural areas (9,86%) as compared to males (35.82%).

During the year 1985-86 the state had 73,490 junior basic, 14,728 senior basic and 5,709 higher secondary schools besides 403 degree colleges and 21 universities. The enrolment of students in these institutions was 119.73, 22.26 43.24, 3.95 and 1.30 lakh respectively. Among them the girls students constituted of 33.52% in junior basic, 24.69 per cent in senior basic, 24.24 per cent in higher secondary schools, 21.33 per cent in the degree collages and 23.12 per cent in the universities. Thus, the proportion of girls has been in between one-third and one-fifth of the total enrolment at various stages of education in the state.

There are 22,440 health care units ranging from the sub-centres to the medical colleges besides 467 M.T.P. centres and 187 ICDS projects in the state. The number of beneficiaries under the M.C.H. and E.P.I. schemes indicate coverage of 88.83% of the target for T.T., 108.89% for D.P.T., 102.51% for D.T., 74.58% for Polio, 111.28% for nutritional (for mothers) 105.36% for children, 105.07% for vitamin 'A' solution, 46.4% for measles, 98.28% for Typhoid and 72.55% for B.C.G. during 1986-87. The coverage under the Family Welfare Programme in the state during 1986-87 shows an

impressive performance. The achievements exceeded the targets in respect of sterilisation (by 14.31%), I.U.D. (by 44.39%) c.c. users (by7.05%), Oral Pill users (by 4.05%) and MTP (0.01%) during this period. However, the targets for sterilisation were achieved for the first time during this period, while the targets for IUD were achieved since 1985-86 and for Oral pill users since 1984-85. The couple protection rate of U.P. is still significantly low (25.0 during 1987) as compared to the country as a whole (37.4).

The birth rate, the death rate and the Infant mortality rate in the state have been significantly higher than that of the country. According to the S.R.S. datat the B.R., D.R. and I.M.R. for U.P. during 1985 was 37.6, 15.8 and 140 respectively. In comparision the rates for India during the same period were 32.7, 11.7 and 95 respectively. The average B.R. in U.P. during the last sixteen years, i.e. 1970-1985, was 40.82 as against34.26 for India, the D.R. was 18.77 as compared to13.93 for India and the IMR, was 168 in the state as against 121 for the coutry as a whole.

In Uttar Pradesh, low age of girls at marriage (mean 18.3 years) and the high proportion of young age amarriages (15-19), son-preference and low literacy rate among females are constraints in fertility reduction. The young age marriages, the fertility behaviour pattern, illiteracy, low socio-economic status, low family planning acceptance and unhygenic conditions in the rural areas and highest proportion of untrained attendants at delivery are some of the significant factors responsible for the higher IMR in the state. state.

Trends:

Infant Mortality in Uttar Pradesh has been significantly higher in comparision with the country as a whole. The IMR for U.P.during 1975 was 198 while for India the rate was 140. The IMR for India during1975 and 1985 has consistantly declined to 95 during the year 1985. In the case of the state of Uttar Pradesh it shows a fluctuating tendency as the IMR declines to 168 during 1977, rises again to 177 in 1978, declines again during 1979 and 1981 after

which it rises to 147 in 1982 and 155 in 1983. Since 1984 the trend indicates a decline in the IMR in U.P. The table below indicate: (a) the IMR in the rural areas have been very high as compared to the urban areas; and, (b) the fluctuations in the IMR for the state of Uttar Pradesh were due to significant rise in the IMR for the rural areas.

Table: 1

Infant Mortality Rate : Uttare Pradesh and India.

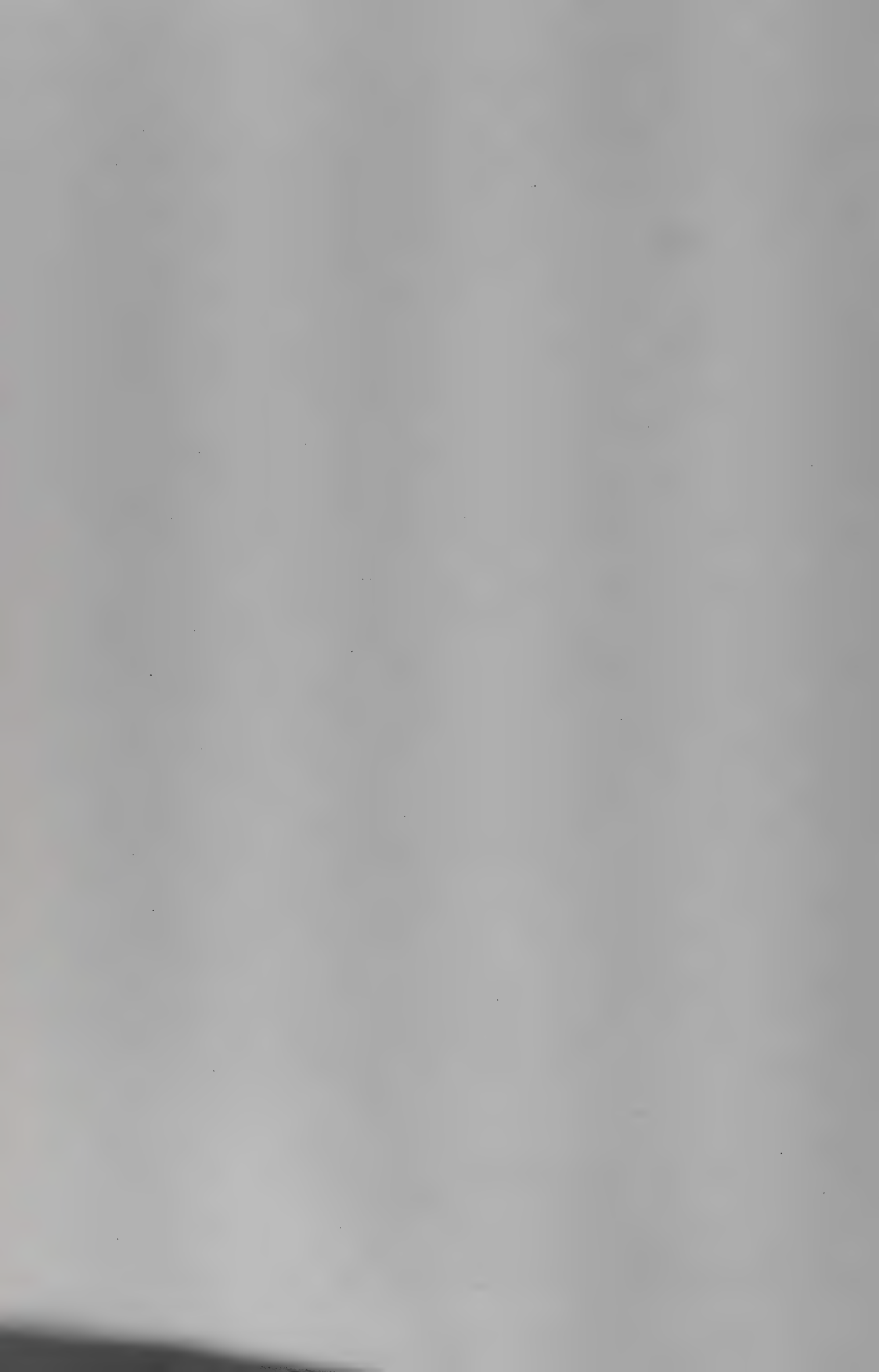| Year	Uttar Pradesh			India		
	Rural	Urban	Total	Rural	Urban	Total
1975	--	--	198	--	--	140
1976	184	121	178	139	80	129
1977	174	119	168	140	81	130
1978	184	114	177	137	74	127
1979	168	104	162	130	72	120
1980	167	99	159	124	65	114
1981	157	97	130	119	62	110
1982	156	99	147	114	65	105
1983	166	100	155	114	66	105
1984	165	99	154	113	66	104
1985	152	97	140	105	57	95
Average 1976-85	167	105	1631	124	69	116

* Source: Government of India, Ministry of Health and Family Welfare, Department of Family Welfare:Family Welfare Programme in India - Year Book 1983-84, (Based on SRS data) and Registrar General of India : Sample Registration Bulletin, Vol.19,No.2, December 1985.

The average IMR for the period 1975-85 was 163 and 116 for Uttar Pradesh and India respectively. Thus the IMR in U.P. was higher by 40.52% from the IMR for India. The average Infant Mortali

Mortality Rate in rural and urban areas of Uttar Pradesh during 1976-85 were higher by 34.67% and 52.17% of the IMR in the two settings of the country as whole. The decline in the IMR in the state was 29.3% in 1985 compared to 1975 while in the country it was 32.1%. In comparision with the country as a whole the IMR in U.P. has declined at a slower pace and the Infant Mortality Rate in urban Uttar Pradesh has been significantly higher as against IMR for the urban parts of India. Another significant feature is that the Infant Mortality Rate in U.P. has remained highest among the states of Andhra Pradesh, Assam, Gujrat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan and Tamil Nadu during 1976-85.

In the absence of district-wise rural-urban Infant Mortality Rates we have confined ourselves to the analysis of IMR in the combined rural and urban areas of the state. The differences in IMR in the two settings of the state are quite significant. The Infant Mortality Rates in the rural areas have been higher in comparision with the IMR in the urban areas. However, in comparision with Uttar Pradesh, the IMR in rural parts of India have been mush higher from the IMR in the urban parts of India. The differences in the IMR in the IMR in the two settings have been much wider in the country than in the state of Uttar Pradesh. For example, the Infant Mortality Rate in rural areas of U.P. in 1976 was higher by 52.01% from the IMR in the urban areas whereas the IMR in in rural India was higher by 73.75% from the IMR in the urban parts of India. In 1977 the IMR in rural U.P. was higher from the urban areas by 46.22% in 1978 by 61.40%, in 1979 by 47.37%, in 1980 by 68.69%, in 1981 by 61.86%, in 1982 by 57.58%, in 1983 by 66.0%, in 1984 by 66.67% and in 1985 by 56.7%. In comparision to Uttar Pradesh, the IMR in the rural areas of country in 1977 higher from the urban parts of India by 72.84%, in 1978 by 85.14%, in 1979 by 80.56%, in 1980 by 90.77%, in 1981 by 91.94%, in 1982 by 75.38% in 1983 by 72.73%, in 1984 by 71.21%, and in 1985 by 84.21%. Similarly, the average IMR in rural India during 1976-85 was higher
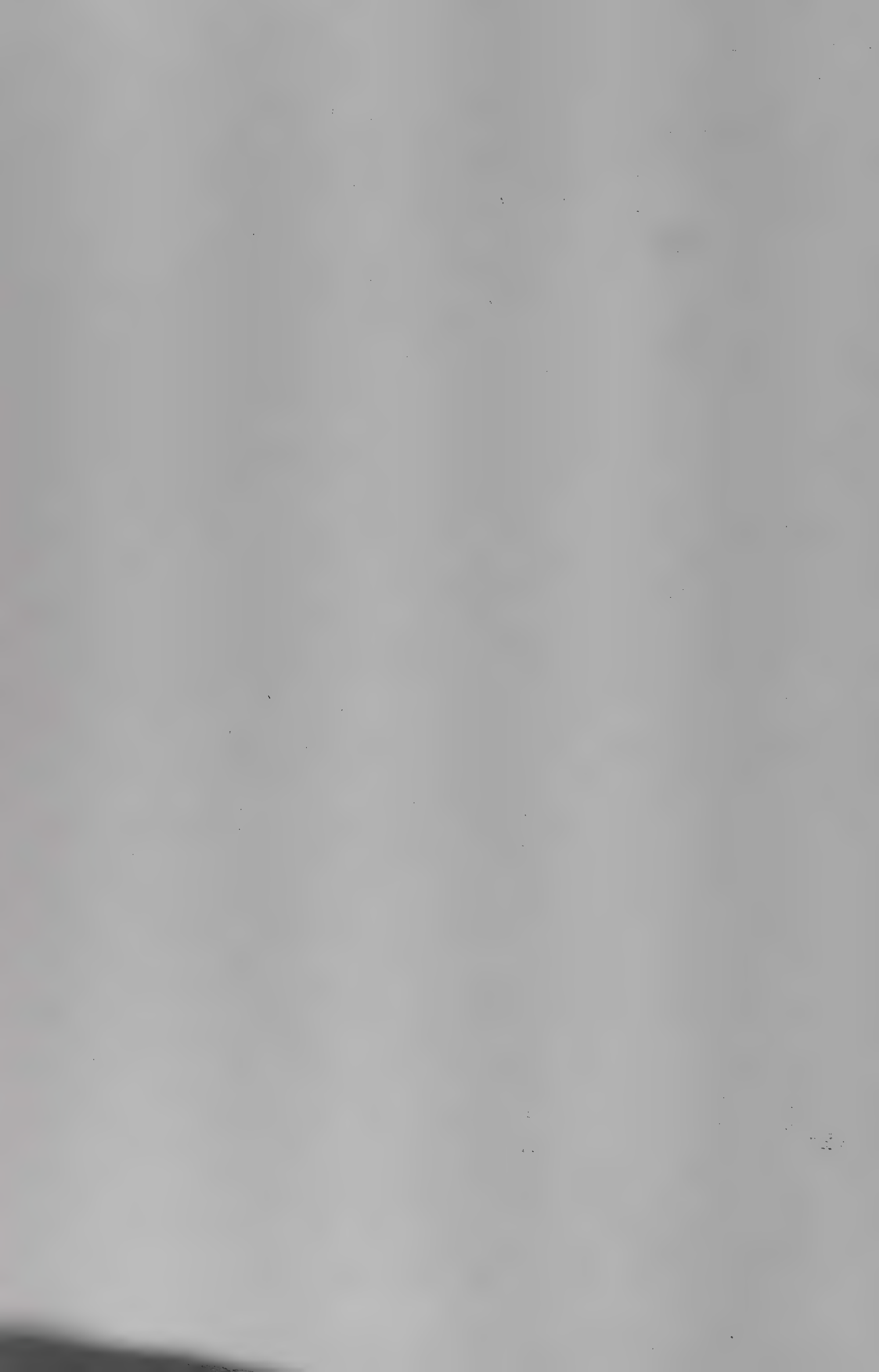
by 79.71% from the IMR in the urban areas as against 59.05% in the state of Uttar Pradesh.
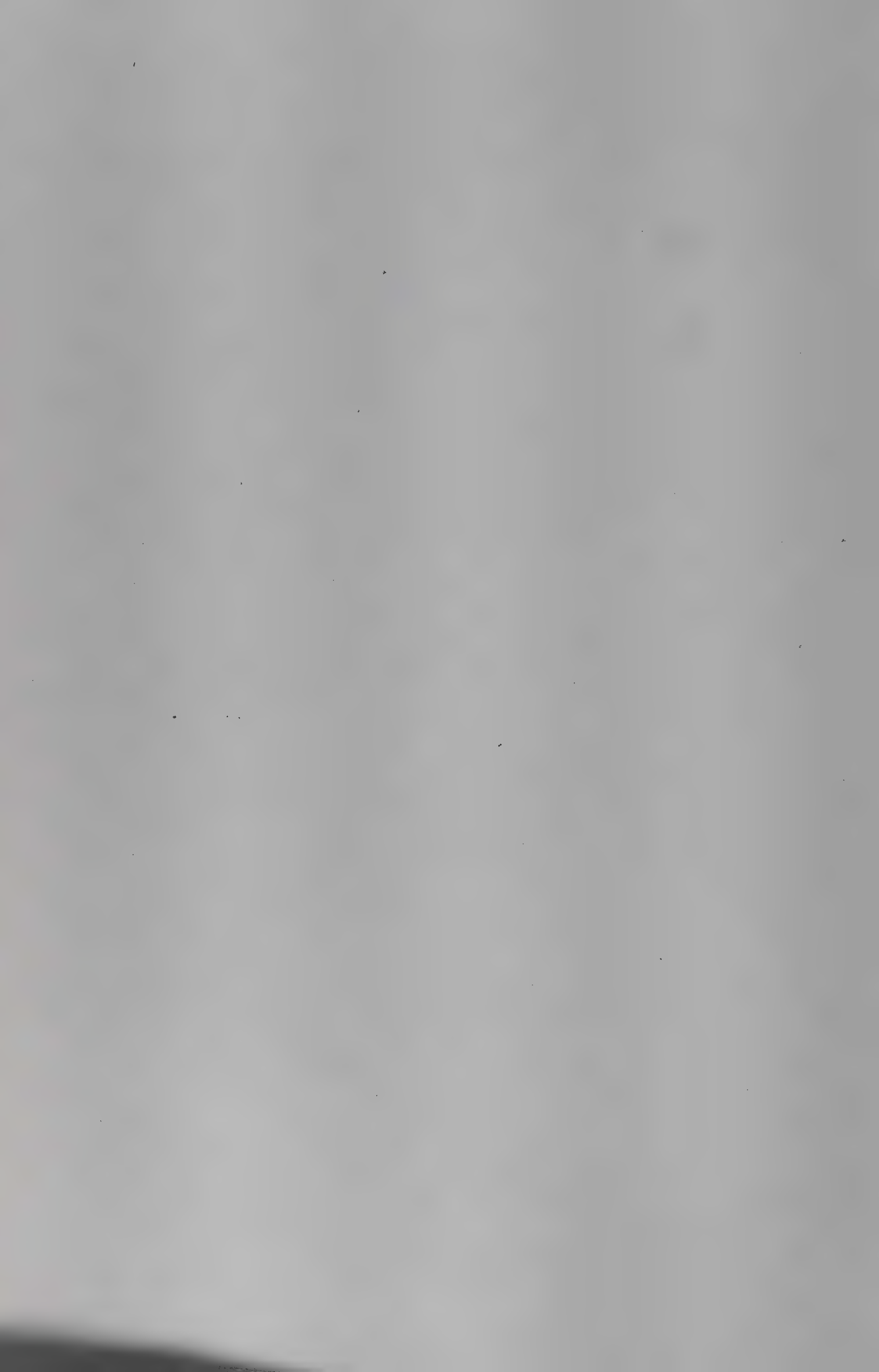
Correlates:

The knowledge of the determinants of infant mortality is a prerequisite for devising policies and programmes for the reduction in the incidance of infant mortality. However, our understanding in in this area is limited. However, we find that poverty is one of the most significant causes of high infant mortality rate as it is related with low level of education of mothers, occupation and low income of father, poor living conditions and malnutrition. Early marriages, interval between births, lack of sufficient medical facilities and adequate number of trained birth attendants, higher fertility rate, unhealthy environment and certain socio-cultural practices have been found associated with higher infant mortality. Some of the studies indicating relation between certain socio-economic, cultural and bio-environmental fiactors and infant mortality are discussed here briefly.

Ruzicka[1] in an urban setting found the educational level of mother and social and economic status of the family, the most effective factors determining the level of infant, neonatal and post-neonatal mortality. The study of Srivastava and Saxena[2] found the indidence of incidence of infant mortality significantly influenced by the caste status, education of mother, occupation of the father and father's income. The infant mortality was reported to be the lowest when the mother's age was between 25 and 29 and who had married in the age bracket 20-24. It was further observed that the incidence of infant mortality was lower (i) where the mothers availed regular antenatal care, (ii) when the birth weight of the child increased upto the normal weight of 2.5 kg. and above and (iii) when the nutrition given to the infant as proxied by feeding index, was higher, Jain[3] and Lal[4] found that family size and malnutrition of mother and infant were important factors associated with infant mortality. Bajpai[5]'s study indicates that

(i) risk of perinatal mortality increases at maternal age of over 25 years and sharply after 35 years, and, (ii) low birth weight was another major cause of perinatal mortality. Mehdi's[6] study indicate that the principal biological causes of perinatal death were related to maternal age and parity. The socio-economic conditions and the nutritional status of the mother were also considered as very important factors associated with infant mortality mortality. Arora[7] found the infant mortality was high when the mothers were in the age group 15-19 years. The study conducted by Bettacharya[8] reveals that Muslims had experienced high infant mortality as compared to Hindus. Among the Hindus, the higher infant mortality was found among socially and economically backward people. The infant mortality was the highest among the agricultural labourerss and lowest among the cultivators. Parent's education was found to be negatively associated with the level of infant mortality mortality. Based on hospital records Arora[9] observed that the infant mortality rates were higher among those infants whose mothers were in the extreme ages of their reproduction viz., 15-19 and 30 years or more. Infant mortality was found to be highest among the first parity mothers, it declined till the third parity and then increased suddenly from parity four or more. Gunasekaran's[10] study also found the highest infant mortality rate when the age of mother was in between 15-19 years. The study also reveals that l longer the interval between two births, the lower was the risk of death in infancy. The rates were highest when the interval was less than two years which declined sharply thereafter. The studies by Dandekar[11], Saxena[12], Pandey[13], and Gandotra, Das and Dey[14] also support the earlier findings that infant mortality rates were higher when the mothers were young, i.e., upto 19 years. Mohan Singh[15] found that the IMR was higher among low income groups, highest among the families residing in Kutcha houses and where well-water was used instead of hand pumped-water. The IMR was low in villages with a sub-centre and in the areas where MCH sw
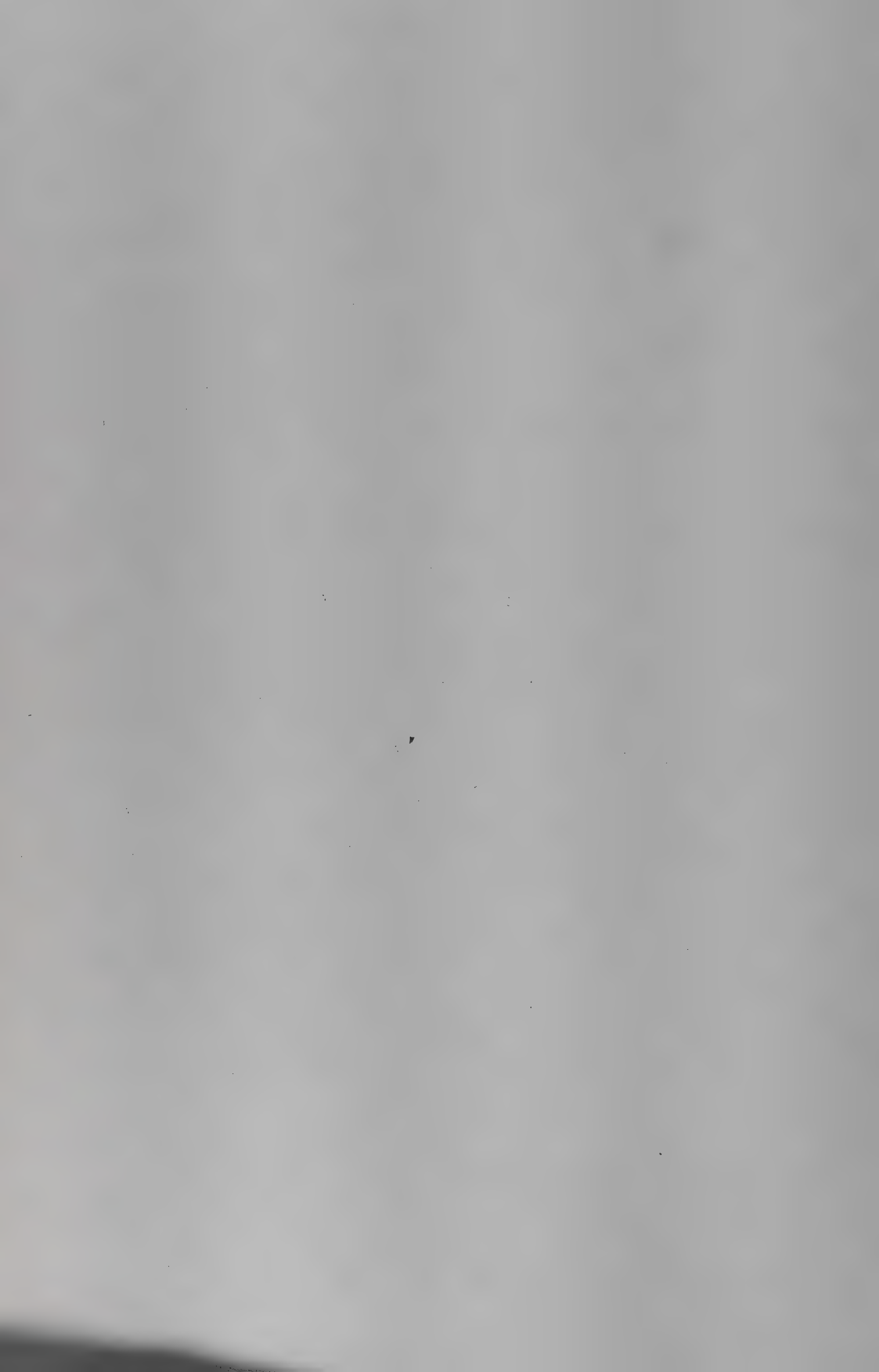
services were available. The study by Gandotra, Das and Dey[16] reveals : (i) the IMR was very high among mothers below the age of 20 years, (ii) the risk of infant mortality was reported to be higher in the first order births and after birth orders 4, (iii) the infant mortality was found to be the highest when the birth interval was less than 18 months and lowest when the spacing between two births was more than 30 months, (iv) the level of education and soci-economic status ofcouple, calorie and protein intake of the mother werenegatively associated with infant mortality.

Besides socio-economic and demographic factors, a number of studies have also attempted to discuss the association of some socio-cultural, nutritional, environmental and other related factors with infant mortality.

Chandrasekhar[17], on the basis of his study, indicated the role of Dai (birth attendant) who is not aware of even elementary rules of health is an important factor for high infant mortality in India. The ignorance of average mother on how to take care of the infants during their infantile ailments plays a sgnificant role in the infant death. Simmons[18] in his study found the village health environment a very important factor related with infant mortality. The significant factors included: previous tetanus in the family type of birth attendant, existance of large animals and age of the mother. Sundar Rao[19] while summarising the major causes of high infant mortality in India on the basis of the results of several studies finds that : (i) IMR was higher when the mother was either very young or relatively older, (ii) the highest risk of mortality was found among first births and after third births, (iii) the risk of survival of the infant was higher if the interval between births was shorter, (iv) vertain customs and habits e.g., branding of the skin, application of cowdung to the cut end of the umbilical cord, frequent purgation, faculty feeding and weaning practices were also associated with high infant mortality, (v) shortage of trained Dais, midwives, health visitors was also an important cause of high infant mortality, (vi) lack of safe drinking water
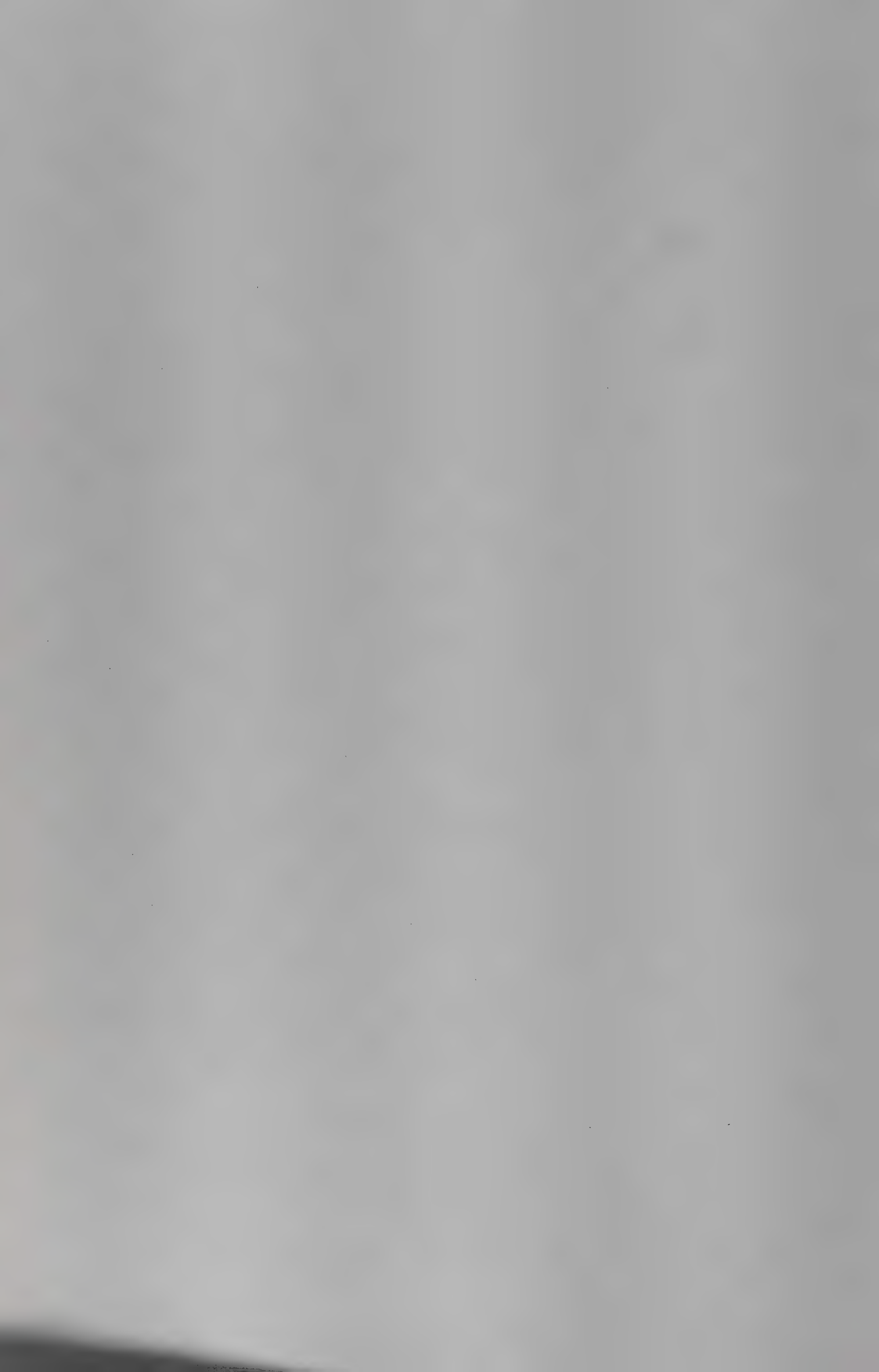
supply, poor housing conditions, bad drainage and insect breeding increases the IMR. Ramachandran[20] observes that ninety per cent of all child deaths could be avoided by safe water and proper sanitation. He estimated about 30 per cent of pregnant women were suffering from acute anaemia in the last stage of pregnancy which was responsible for the high incidence of prematurity, a major factor in infant mortality. Malnutrition has also been found responsible for high incidence of diarrhoea and certain respiratory infection in post-neonatal period among poor communities. Swamy[21] found lack of sufficient number of trained births attendants an important factor in higher IMR. Bhattacharjee[22] analysed that the states with higher IMR had a low level of literacy and urbanization relatively lower level of medical services and lower age at marriage for females. While reviewing literature on infant mortality in India Ashok Mitra[23] listed the following reasons of high infant mortality : (a) malnutrition of mother and child both before and after birth, (b) exposure and bad housing, (c) unprotected water and food for the new born, and (d) incompetant assistance, medical or otherwise, at and after child birth.

Determinants:

The causes of mortality during the neonatal and post-neonatal periods may be different. On the basis of the available studies some major causes of infant deaths are summerised below:

On the basis of data from the Model Registration Scheme in Rural India, Ramabhadran[24] listed the important causes of infant deaths. They were: Broncho-Pneumonia and Pneumonia; deseases peculiar to infancy; prematurity; infection of the new born; dysentery and tetanus. Simmon[25] found the major clinical cause of death during the neonatal period was tetanus which accounted for about two-thirds of neonatal deaths. During the post-neonatal period the major causes of mortality were general infections or inflammatory diseases, such as maleria, small pox, diptheria or fever. Karkal[26] found two major causes of infant deaths. They were: congenital malformation and diseases of early infancy. Faujdar's study indicates that infective and parasitic diseases

followed by diseases of digestive system disorders and diseases concerning respiratory system were the major causes of infant deaths. It was further observed that among the deaths due to infective and parasitic diseases, almost 50% deaths were due to single causes tetanus. Jha[27] analysed the clinical causes of infant mortality over a period of 20 years. It was observed that in the age group 0-1 year, Pheumonia was a major cause of mortality followed by congenital malformations and birth injuries. Ashok Mitra[28] observed that in communities with relatively poor health, sanitary condition and nutrition, infective and parasitic disease were the most important killers of infants, but if these conditions are brought under control, diseases of respiratory system and of metabolism and nutrition assume greater significance. The report of the Registrar General[29], India identified tetanus as the major cause of infant deaths in rural India followed by prematurity.

Badri found prematurity and respiratory infections as main causes of infant mortality in the neo-natal period and diarrhoea and respiratory infections in the post neo-natal period. Bhatia's[31] study found that a high percentage of infant deaths were due to causes of perinatal mortality followed by infective and parasitic diseases and diseases of the respiratory system. Swamy[32] found a high percentage of infant deaths were due to causes peculiar to infancy i.e., prematurity birth infuries, respiratory infection and diarrhoea. The disorders of the respiratory system was mostly due to pneumonia. The analysis of the causes of infant deaths by Jain[33] indicated prevalance of diseases of early infancy, important among which were prematurity and respiratory infections in the rural areas. Convulsion, diarrhoea and malnutrition were found the other important causes. In the urban areas indicated a high incidence of the diseases of early infancy (neonatal). Infective, parasitic and respiratory disease were important during the post neonatal period. Pneumonia, enteritis and other diarrhoeal diseases were also found to be the important specific diseases causing infant death.

Gandotra and Das[34] found more than 60 per cent of the deaths during neo-natal period occurred due to infective and parasitic diseases. During the post-neonatal period infective and parasitic diseases were again the main killers of infants. Indants deaths due to diseases of the respiratory system like acute bronchitis and pneumonia were also noted to be high. Sunder Rao[35] observed that the major causes for neonatal mortality were prematurity and congenital malformations. Infectious diseases coupled with malnutrition were some of the main causes of high infantt deaths during the post-neonatal period. Gandotra and Das[36] has summerised the causes of infant deaths that have emerged from various studies, during the neonatal and post-natal period. They are:

1. Causes of deaths during the neonatal period include:
    (a) Certain conditions orginating in the perinatal period such as Pre-maturity, infection like tetanus, convulsions, toxemia, birth infuries and low birth weight;
    (b) Diseases of respiratory system such as pneumonia and other respiratory infections;
    (c) infective and parasitic diseases like diarrhoea; gastro-enteritis etc;
    (d) congenital anomalies; and,
    (e) diseases of central nervous system such as meningitis.
2. Some of the important causes of deaths during the post-neonatal period include:
    (a) infective and parasitic diseases such as infantile gastro-enteritis, dysentry and toher diarrhoeal diseases, bactarial diseases like tetanus and viral diseases such as measles, whooping cough and diptheria etc;
    (b) diseases of respiratory system like Broncho-pneumonia and labour-pneumonia;
    (c) metabolic diseases especially the protein - caloric malnutrition in association with the respiratory diseases, tuberculosis and parasitic infestation; and
    (d) post-natal Asphyxia and group of conditions associated with pre-maturity.

Implications:

In a traditional society like India where a large family is considered desirable and a large number of males in the household is considered a source of social and economic strength many couples ignore the idea of birth control. They also want to be sure that they would have a sufficient number of sons to support them during their old age. This cultural pattern leads to higher fertility and the higher ferility enhances the chances of mortality among infants.

Kulkarni's[37] study of twelve states revealed a direct effect of infant mortality on fertility. Kurup[38] found a high correlation between infant mortality and birth rate. However, infant mortality rate and birth rate have been found to have high negative correlation with bed-population ratio and per capita expenditure on health services. Das[39] found the birth order intervals were associated not only with the death of the previous infant, but death of earlier infants as well. His study revealed the interval between the second and the third births was longest when the first two infants survived and it was shortest when they died before age one. The study of Srivastava and Pandey[40] covering over two thousand households in a PHC area of Uttar Pradesh found the infant mortality was 159 per thousand live birth. Their analysis of interval between two successive births according to death or survival of the infant and some social and deographic characteristics revealed that infant mortality reduces the birth interval considerably, more so when a male infant dies. This was found to be true irrespective of the mothers age, parity, proportion of children surviving, type of family and caste of the couple. Omran and Standley's[41] study found that the mean interval between the birth of child when died in infancy and the end of the subsequent pregnancy was shortened by 6 to 8 months as compared to the interval when the child survived the first year of life. Prakasam[42] concluded that the death of an infant induces a desire to replace the lost child thereby motivating the couple to have more number of children than otherwise they they would like to have. 'Hence to control this excess fertility it is mandatory that adequate protection is given to the living Child'.

Talwakar's[43] study indicated infant mortality as stronger cause
of high fertility than high fertility as a cause of infant mortality.

As regards the impact of fertility on infant mortality a
number of studies revealed a higher mortality rate for the first
birth than the second and third births. These rates rise sharply
from the fourth birth onwards. Khanna's[44] study indicated an in-
creased hazard to life by short intervals between births. The study
of Das[45] also supported these findings. He observed that the babies
born within shortintervals were subjected to comparatively higher
mortality, regardless of the order of the birth interval. The
possible reasons of such impact could be that births in rapid
succession affects the mother's health adversely which carried
impact on the physical constitution of the new born. On the other
hand, mother's capacity to take care of the new born during infanyy
is reduced. Lack of adequate care by weak mothers and the weak
physical constitution of the new born reduces the chances for his
survival. Gandotra, Das and Dey[46] observed the importance of
mother's age and interval between two births for the survival of
the child. They found that most of the children survived were
those born to mothers in the age group 20-29 and whose pregnancies
had been spaced at intervals of atleast thirty months or more.

Current Schemes:

The Draft Seventh Five Year Plan of the state of Uttar Pradesh
admit that 'On the health-care side, considerable intra-regional
and rural urban disparities exist in the relative distribution
medical services..... The comparative picture of the health status
of the people of this state as compared to the National average and
other States continues to be unfavourable as jdged from infant
mortality and death rates..... Theavailability of indoor beds,
doctor-population ratio and nurse-population ratio in the state also
compares unfavourably...... The main issues in health planning
therefore, are:

(1) High rate of population growth;
(2) High mortality rate specially of infants;
(3) The extent and severity of malnutrition;
(4) Non-effective control of communicable and non-communicable diseases;
(5) High incidence of diarrhoel diseases and other infectious diseases especially among infants and children; and,
(6) Lack of safe potable drinking water and environmental sanitation.

Another significant aspect of the shortage of properhealth care facilities is that a large number of births are attended by untrained persons. The SRS data from the Registrar General of India indicatei.that 94.1% and 93.7% of the total sample births in rural Uttar Pradesh were attended by untrained persons during 1970-72 and 1976-78 respectively as compared to 57.1% and 63.6% at the National level in the two periods respectively. In the urban areas, against 33.8% and 24.8% at the National level, 54.9% of the sample births during 1970-72 and 40.7% during 1976-78 were attended by untrained persons in Uttar Pradesh.

To attain the National goal of health for by 2000 A.D., which include among other indicators, reduction in Birth Rate to 21 per 1000, Infant Mortality Rate to less than 60 per 1000 live births and Growth Rate to 1.20 and enhancement in the percentage of couple protection to 60, pregnant Mothers receiving antenatal care to 100 and deliveries by trained birth attendant to 100, the family welfare measures have to be strengthened. Besides,,more efforts are required for improving the sanitary and water supply conditions.

In order to improve the health of mothers and children and guard them against a number serious ailments a number of programmes are in operation in the State. Some of the most important of these programmes are:

1. <u>Maternal and Child Health Programme</u> (M.C.H.)

The services under the M.C.H. Programme could be classified under the four main groups:

(a) Ante-natal care of pregnant mothers;

(b) post-natal care of mothers and new born babies;

(c) safe delivery of children; and,

(d) immunization of children.

Recognising the close relationship between high birth rate and high infant mortality the Seventh Five Year Plan of the state has given high priority to the M.C.H. Programme. Besides, preventive promotive and educational aspects of the M.C.H. services will be given highest priority. And, health care for mothers and children will be strengthened through the primary health care approach.
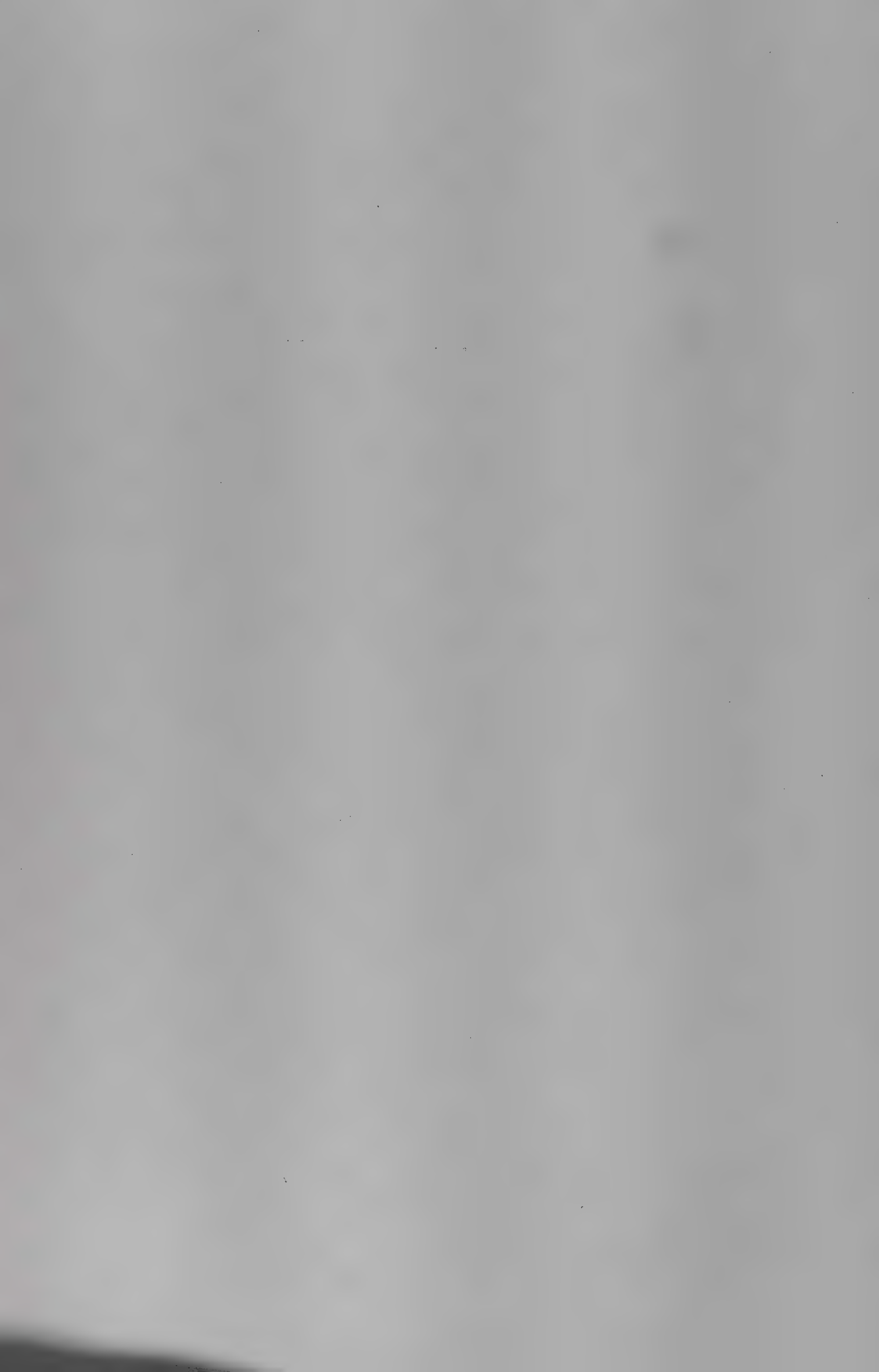
2. <u>Integrated Child Development Services (ICDS)</u>

Under this programme the following services are provided to the child population, expectant and lactating mothers of the selected areas in the state:

(i)   Supplementary nutrituion;

(ii)   Immunization;

(iii)   Health check-up;

(iv)   Referral services;

(v)   Non-formal education;

(vi)   Nutrition and health education;

(vii)   Supply of safe drinking water.

Under the scheme one project per one lakh population is set-up in the urban as well as rural areas and one project per 35000 population in areas dominated by tribals. The centres set-up under the scheme provide nutritions diet worth 45 paisa per normal child, 75 paise per pregnant and nursing woman and 95 paise per mal-nourished child per day for 300 days.

The ICDS projects launched on 2nd October 1975 are at present 202 in number in 54 districts of the state. Out of them 22 projects are in the Hill areas. Of the 202 projects, 8 are in the state sector and 194 in the Central sector. The Cooperative for American

Relief Everywhere (CARE) is providing nutritional food free of cost in the 449 projects and the World Food Programme (WFP) in the 61 projects in the State. The Government of Norway is providing financial assistance for meeting expenditure on administration and nutritional food in 27 projects of the State.

3. Expanded Programme of Immunization (E.P.I.):

A significant part of high morbidity and mortality among infants and children in attributable to certain common communicable diseases. Efforts are on to prevent them by immunising children and pregnant mothers under the E.P.I. The objective of the E.P.I. Programme during the Seventh Five Year Plan is to reduce the incidence of Diptheria, Whooping cough, Tetanus, Polimyclities, childhood Tuberclosis and Typhoid fever by making vaccination services available to all elligible children and pregnant mothers.

4. Universal Immunization Programme (U.I.P.):

The programme was introduced in the country with the help of the UNICEF in 1985. The main objective of the programme is to protect the infants (0-1 year) against common childhood diseases such as: Tetanus, Polio-Myelitis, Tuberculosis, Diptheria, Whooping cough and Measles. At present 20 districts of the state are covered under this programme. The target under this programme is to immunize 85% of the total infants and coverage if 100% of the pregnant mothers for Tetanus Toxide every year in the districts covered under U.P.

Achievements:

The achievements under the various important programmes such as Family Welfare, M.C.H., E.P.I. and U.P.I in the State have been analysed for the period 1980-81 to 1986-87. During 1980-81 and 1984-85, which is the period of the Sixth Five Year Plan, we find that against a target of 29.94 lakh only 45.62 per cent sterlisations were done; 83.46% of a target of 17.41 lakh I.U.D. was achieved; 51.65% of the target of 3.93 lakh Oral Pill Users was achieved and the achievement exceeded the target for C.C. Users (106.46%). The

position from 1985-86 to 1986-87 has improved very significantly when achievements have exceeded the targets (except in case of sterilisations were achievement exceed during 1986-87).

The achievements under the M.C.H. and E.P.I. scheme indicate the number of mothers and children receiving nutritious diet had exceeded the targets of 45.0 lakh each by 9.86% and 4.44% respectively during the period of five years. The Vitamin 'A' solution was given to 62.4% of the target of 126 lakh children. Only 65.3% of a target of 64.2 lakh pregnant mothers were immunized against Tetanus. The targets for D.P.T. were 90.2 Lakh, for D.T. 77.5 lakh, Polio 36.39 lakh, Typhoid 81.7 lakh and B.C.G. 79.0 lakh. However, the achievements were limited to 50.77%, 71.74%, 61.64%, 36.36% and 85.30% respectively. The achievements for 1985-86 and 1986-87, however, shows a market improvement.
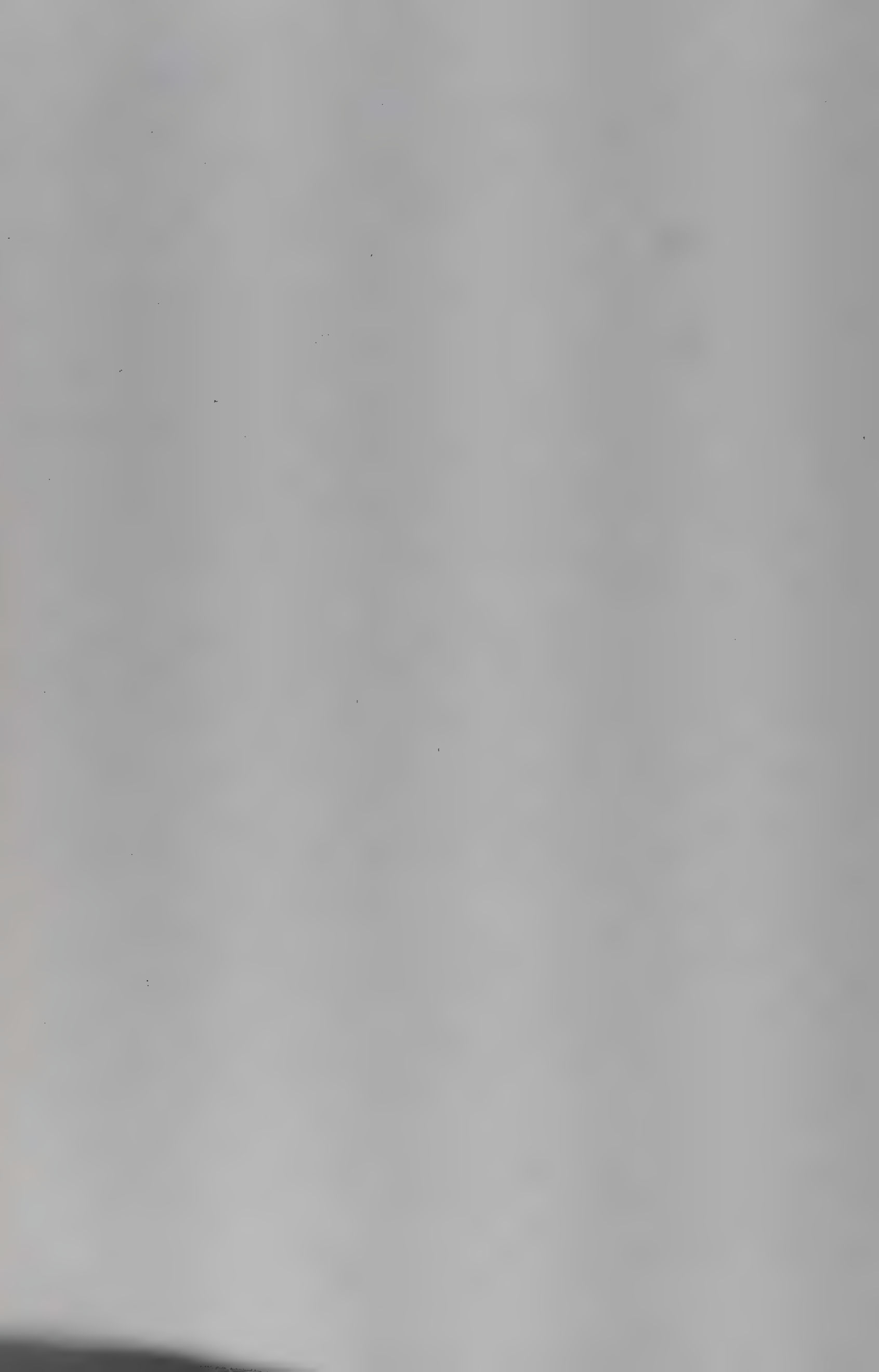
Sanitation and Water Supply:

For ensuring the health and reduction in the case of infant deaths it is also necessary that all towns and villages should have the facility of hygienic water supply and proper sanitation. With this in view the United Nations Water Conference, in March 1977, decided that 1981-90 would be known as "International Drinking Water Supply and Sanitation Decade". India accepted the recommendation in principle. The targets fixed for the decade are (Rural areas):

(a) Rural Water Supply - 100% of the rural population to be covered with basic minimum need of water supply.

(b) Rural Sanitation - 25% of the rural population to be covered with sanitary toilets.

A total of 35,506 villages having drinking water problem were identified in the State during 1971-72. By the end of March 1984, 25,956 problem villages were covered and it is estimated that except 750, all the remaining problem villages have been covered by the end of the Sixth Plan.

As regards rural sanitation, some feasible attempts by the Rural Development Department in the shape of construction of drains and paving of village roads at a few places, no significant effort has been made to improve rural sanitation. The availabilities of such facilities in the villages of the State, thus, remains almost negligible.

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CHAPTER-II

The National Health Policy (1983) while reviewing the achievements in the promotion of health status of the people since independence has highlighted the elimination of Smallpox and Plague and a decline in mortality from Cholera and related diseases and the control of malaria to a considerable extent. It, however, felt that in spite of such impressive progress, the demographic and health picture of the country still continues to have an adverse effect on the health of our people and the quality of lives. The mortality rates for women, children and infants are still distressingly high. Efforts at raising the nutritional levels of our people have still to bear fruit and the extent and severity of malnutrition continues to be exceptionally high. Communicable diseases have still to be brought under effective to have a high incidence. Only 31% of the rural population has access to potable water supply and 0.5% enjoys basic sanitation. High incidence of diarrhoeal diseases and other preventive and infectious diseases, specially amongst infants and children, lack of safe drinking water and poor environmental sanitation, poverty and ignorance are among the major contributory causes of high incidence of disease and mortality.

Our National Health Policy has set the goal for India to bring down the infant mortality rate from 106 in 1985 to below 60 by 2000 A.D. The goal can be acieved only if we have an accurate knowledge of the risk factor responsible for infant-mortality. The appropriate intervention strategies can be formulated after we acquire such knowledge. The present study is precisely aimed at this.

Study Design:

The study has been conducted in eight different population groups such as hilly, tribal, rural, urban and slum areas in five states, iee. Uttar Pradesh, Madhya Pradesh, Karnataka, Orissa, and Maharashtra. The research phase of one and a half year will be followed by the action phase of an about equal duration.

The project is a collaborative venture jointly sponsored by the International Development Research Council, Canada and the Family Planning Foundation, India. The following institutions have conducted the study of different segments of population in the states:

Institute/Project Leader	Population Group (s)	State/City
1. Giri Institute of Development Studies, Lucknow (Dr.MS ASHRAF &Dr T S Papola	Hilly and Rural Areas	Uttar Pradesh
2. National Institute of Health and Family Welfare, New Delhi (Prof Rita Sapru & Dr Indira Murali)	Rural Areas with high and low immunization rate.	Madhya Pradesh
3. Population Centre, Bangalore (Dr.P.H.Reddy & Dr. P.J. Bhattacharjee)	Rural and Urban Areas	Karnataka
4. Institute of Tribal Health and Social Sciences, Bhubaneswar (Dr.Almas Ali& Mr Karunakar Misra)	Tribal Areas	Orissa
5. Bombay University (Dr. Victor S D'Souza)	Slum Areas	Bombay

Objectives:

The objective of the study was to understand the various factors contributing to higher risks of mortality among infants so that strategies can be devised to help accelerate the process of decline in infant mortality. With this in view an attempt has been made to study the social and physical environment, infrastructure, the health facilities, socio-cultural practices and the relationship between infant mortality and fertility. More specifically, the objectives of the study were:

1. to identify determinants of infant mortality in India, to know their mechanism and find out their relative risk with a view to devise the most effective intervention modes in the second phase;

2. to understand various socio-cultural practices followed by the people before, during and after pregnancy which are detrimental to the infant survival and ascertain the logic behind them with them with a view to manipulate changes in them in the second phase; and,

3. to examine the inter-relationship between infant mortality and fertility with a view to devise strategies for reducing them effectively.

APPROACH

The epidemiological risk approach was followed in this study. This approach looks at the frequency of the unwanted outcome such as infant mortality or mortidity in a given population when the risk factor is present and when it is absent to find out absolute, relative and attributable risk which can be reduced or eliminated by appropriate intervention strategies. It helped us to know which individuals, families or groups were more vulnerable to risk factors than others or at high risk and to measure their need for suitable interventions by which the risk can be reduced or eliminated in a definite manner.

This approach integrates both social and medical sciences and looks for the whole spectrum of risk factors which might be affecting infant mortality directly or indirectly, independently or jointly in a cumulative or circular manner. It assumes that risk factors are social, economic cultural, behavioural, biological and environmental in character, endogenous and exogenous in nature related to mother and child, family and community, personnel and institutional providing relevant health care services, and operate at various stages of life cycle such as pre-natal, natal and post-natal in a time sequence. The risk factors, grouped into five, were studied. The included: (a) factors connected with experience of earlier reproductive life; (b) factors affecting risk at the time of conception; (c) factors affecting risk at the time of growth and development of foetus during gestation period; (d) factors affecting risk at the time of delivery of baby; and (e) factors affecting risk at the time of growth and development of the infant.

Most retrospective data both quantitiative and qualitative in nature was collected from communities, health personnel, households and mothers of children born in the last 2 years (before survey) through focused, directed and indepth interviews using schedules and guidelines in a uniform manner.

Coverage:

The present study covers two population groups, i.e., Hilly and rural areas of Uttar Pradesh. The districts in the two population groups were selected on criterion of the highest proportion of rural population among the districtsof the regions of respective areas. However, in the case of rural areas one district, i.e., Etawah, was selected which had the proportion of rural population next to district Mainpuri because our field team faced some serious problems there and we apprehended the possibilities of getting unreliable data. Besides, there were also strong possibilities of the field work getting delayed. The districts in the Hilly areas included: Tehri Garwal, Pithoragarh and Almora. In rural areas, Rae Bareli from central U.P., Banda from Budelkhand region, Etawah from western U.P., Basti and Sultanpur from the Eastern region were selected.

The proportion of rural population the selected districts, according to 1981 Census, was 95.87% in Tehri Garhwal, 94.48% in Pithoragarh and 93.72% in Almora of the Hill population group. In the Rural group Rae Bareli had 92.63% rural population, Banda 88.20% Etawah 85.21%, Basti 95.20% and Sultanpur 96.70%. IN the Hilly population group three blocks per district were selected. Out of them two Blocks were non - ICDS and one an ICDS Block. IN the Rural population group, one ICDS and one non - ICDS Block per district were selected. The selection of the Blocks was also guided by the same criterion. i.e., highest percentage of rural population among the ICDS categories of Blocks of the selected districts.

The district-wise selected Blocks and their status was as
follows:

District	Block	Status
A. Hilly Population		
1. Tehri Garhwal	1. Theoldhar	Non-ICDS
	2. Chamba	Non-ICDS
	3. Jakhnidhar	ICDS
2. Pithoragarh	1. Berinag	Non-ICDS
	2. Bin	Non-ICDS
	3. Gangolighat	ICDS
3. Almora	1. Bhikiyasen	Non-ICDS
	2. Tarikhet	Non-ICDS
	3. Salt	ICDS
B. Rural Population		
1. Rae Bareli	1. Satoon	Non-ICDS
	2. Harchandpur	ICDS
2. Banda	1. Baberu	Non-ICDS
	2. Bisanda	ICDS
3. Etawah	1. Mahewa	Non-ICDS
	2. Basrehar	ICDS
4. Basti	1. Bahadurpur	Non-ICDS
	2. Khabilabad	ICDS
5. Sultanpur	1. Bhetuwa	Non-ICDS
	2. Musafirkhana	ICDS

SAMPLING

At the first stage for the Hilly population group, three
districts, namely, Tehri-garhwal, Almora and Pithoragarh and for

the Rural Population group five districts of the plains viz.,
Sultanpur, Basti, Rai Bareli, Etawah and Banda, with the highest
rural population in their respective regions were selected. At
the second stage, within each district in Hill areas three blocks
(one coveredy by I.C.D.S. and two others) were selected with
the same criterion of highest rural population. Initially, the
project design had suggested selection of 10 villages/clusters
per Block. However, during the course of survey we noticed a
high fertility and infant mortality rate. The sample was, then,
revised to 8 villages/clusters perBlock except in the case of
Tarikhet Block of district Almora where 10 villages/clusters had
been completed by the time we revised the sample. In each of the
eight villages/clusters 120 households were selected and surveyed.
For the study of Rural Population group the number of blocks per
district were two (one I.C.D.S. and onenon I.C.D.S.), the number
of villages/clustersper Block was the same as in the Hilly Popula-
tion group. However, the number of households per villages/
cluster in the Rural Population group was 150. The schedule III
seeking details about the family memebrs was, therefore, adminis-
tered on 120 households for village/cluster in the Hills and on 150
households for village/clusters in the plains of Uttar Pradesh.
On the basis of the household survey the sample of eligible women
was drawn. The sample of eligible women whom the child was born
in the last two years included at the following rate:
(a)   all women whose children died during infancy,
(b)   every alternate woman whose child survived.

The survey in the Hill areas had a sample of 8,880 households
and in the Rural areas 12,000 householdsin which the sample of
mothers was 1,693 and 3,949 respectivly. However, on scruitiny,
some schedules were rejected. The final sample, thus, included for
analysis constituted of 1,572 mothers of 8,572 households in the
Hill areas and 3,837 mothers of 11,419 households of the Rural
areas. The total sample of the Hill and Rural areasof Uttar Pradesh,

therefore, consisted of 5,409 mothers of 19,991 households of 19 Blocks in the eight districts

SCHEDULES:

After selecting the village/cluster in Hilly and Rural areas as per the procedure described earlier the following four schedules were administered on different categories of the sample.

Schedule 1 : (for community i.e., village)
Schedule 2 : (for Health Workers i.e., Dai, ANM, Doctor)
Schedule 3 : (for household in the selected sample)
Schedule 4 : (for mother of child born alive in the last two years.)

Schedule 1 was designed to collect basic information about the sample villages such as population, health and educational facilities and available infrastructure. This was Canvassed with the cross section of well-informed persons of the village such as the Pradhan, the members of the Panchayat, Co-operatives, teachers of the schools etc.

Schedule 2 was designed to collect basic information from local health workers such as Dai, ANM, Female Health guide, Health visitor and Medical officer dealing with the health problems of women and children and providing MCH or Family Planning Services to the people of the sample villages. The information sought through this Schedule was pertaining the personal background of the health workers such as : educational and training background, service experience levels of job satisfaction, tasks performed, knowledge about appropriate MCH services and the level of professional competence among them.

Schedule 3 was designed to list all usual residents in sample households, and collect basic information about them (such as sex , age, educational level, marital status, age at marriage and at Gauna), find out number of children born alive so far and in the last two years and the number of those who are surviving and the birth order in case of infant deaths. The information about birth of children was collected from the currently married women with

with a view to identify and select sample of eligible woman to
whom schedule 4 was to be canvassed. The shhedule III canvassed
either to the head of the household or an elder, responsible and
knowledgeable person in case the head of the household was not
available.

Schdule 4 was designed to collect detailed information about all
socio cultural, environmental and biological risk factors operating
during the pre-natal, natal and post-natal stages. The risks also
included those arising from socio-economic and physical environment
of the household. More specifically, the Schedule sought informat-on
ion about (a) Maternal History, starting from the age at marriage
to the outcome of pregnancies including the complications developed
during pregnancies; (b) History of Live Births including mother's
age at child birth, duration of pregnancy, birth interval, cause of
death in case the child did not survive and use of contraceptives;
(c) Pre-natal Risk Factors operating during the period of index
pregnancy which included a list of sickness/symptoms, Antenatal
Care received, certain personal habits sueing pregnancy, dietary
intake, work and leisure etc; (d) Natal Risk Factors operating at
index delivery including conditions during labour and delivery,
problems experienced by mother at delivery, complications experien-
ced by child at birth and medical attention received; (e) Post-
natal Risk Factors including the age of the child when supplemen-
tary foods were introduced, immunization, ailments - their duration
and medical attentiongiven, growth of the child, symptoms of mal-
nutrition in the child and knowlädge about usual health problems
gained through mass media; (f) Socio-Economic and Environmental
Risk Factors including socio-economic conditions, housing conditions,
household income and expenditure etc.

The Schedule IV was canvassed to the women to whom the child
was born during the last two years. Since the schedule was prepa-
red in English it was felt during the pretesting that it can pise
some problems of communicatingbecause a number of question inclu-
ded medical terminology. Besided, due to the association of a
large field team in the survey the uniformily in communicating the
essence of the question was also not certain. Considering these
aspects we translated this Schedule into simple and understandable

Hindi. This minimized the chances of errors in communication between the investigators and the respondents.

Schdule I and II were canvassed by the field work Supervisors and schedule 3 and 4 by the Investigators. The completing Schedule I and key health workers for collecting information on shceduleII. They also established rapport with influential residents of the villages for ensuring cooperation from the samle population.

Study Team:

The study team consisted of the following:

Project Director

Coordinators   Supervisors

Data checkers   Investigators

Initially there were two project Directors. However, one of them, Prof. T S Papola went on long leave after some time. The project Was therefore supervised by one person. The Project Director, with research experience of about twentyfive years, holding a senior faculty position at the Giri Institute of i Development Studies, Lucknow was assisted by a team of two field-work coordinators, eight Supervisors, 77 Investigators and three data checkers.

The two coordinators were post graduates in Social Sciences. One of them had experience of about five years in different re-search projects and the other had about one year experience in research projects and about three years in teaching at graduate level. They were monitoring Progress of field work, checking the data collection work in the sample areas, helping the supervisors and investigators in establishing rapport and in solving their problems; verifying a sample of data collected by the Investigators by contacting the interviewed families; and maintaining various records.

The eight supervisors, post-graduate in one or the other social sciences with experience of working in projects ranging from one to about two years were assigned supervision of field work of one district each. In order to ensure proper sampling and reliability of data constant supervision was essential. During the period of survey they, therefore, stayed in the field.

The Supervisors were given an intensive training for about
a month. During the training, objectives, approaches, sampling
procedures, methods of interviewing, coding and verification
procedures were explained in detail. A large portion of the pe-
riod was devoted to discussing the four Interview Schedules,
particularly the Schedule IV. Dr B R Patil, Project Director,
Family Planning Foundation, New Delhi, also spent two days with
the team. He explained the background, the Schedules and clarified
certain points. The supervisors were also engaged in a number of
group discussions among themselves. This helped the Project
Director to understand the capabilities of each of them. During
the course of group discussions two persons were identified as
'weak' and, therefore, were replaced. They also conducted some
interviews locally, which were examined and further explained in
case lack of clarity about the essence of the questions was noticed.

After the training they were placed in the selected districts
where they also identified Field Investegators through the help
of the Department of Social Science's of the University/Post-
graduate/Degree Colleges/Health/Block officials. They also trained
Investigators, identified the sample villages established contacts
with the resourceful persons of the area and supervised the data
collection. The training of local Investigators was arranged in
their districts as none of them was prepared to attend the training
at Lucknow. However, the Project Director also visited these
places during the training period so that uniformity could be
maintained. He also explained the various aspects of the study
and its Interview Schedules. Besides, the coordinators also
visited these places and helped the supervisors and the Investi-
gators in solving their problems.

We faced serious problems in finding out suitable female
Investigators in Lucknow as none wanted to go to remote rural areas
for the field work. We , therefore, recruited the Investigators
locally, mostly from the selected Blocks. Their number in a dis-
trict depended on three considerations : (a) the locations of
selected villages in the Blocks (b) the availability of suitable

females who could undertake the job sincerely and complete the survey at the earliest and (c) the number should be manageable. Since the availability of post-graduate females in the rural areas was difficult. The minimum educational qualification for them kept at B.A. with atleast one of the Social Sciences. The field work was conducted simultaneously in all the blocks of the selected districts. In all, a total of 77 field Investigators were engaged in the eight selected districts, 29 in the three Hill districts and 48 in the five districts of plains of Uttar Pradesh. The Investegators were trained for one week to ten days before they started the survey. The Supervisor remained there throughout the period of survey, He helped them if they faced any problem, checked their performance in the field, verified a selected number of interviews and got the interviews re-done in case there were serious inaccuracies.

Field Operations:

The primary data was collected from all the eight districts of U.P. in between January and June 1987. One district from each of the Western, Central and Bundelkhand and two district from the Eastern region of the state were selected for the survey. The data about the births and infant mortality were collected for the last two years.

All the investigators who conducted the survey were females. Their recruitment at Lucknow was not possible as none wanted to go to the remote rural areas for the field work. We, therefore, recruited them to the extent possible, from the selected blocks. However, this arrangements too did not prove a smooth sailing at all the places. The first problem was of finding the sufficient number of graduated with interest in survey work. At least in two districts we faced the problem seriously. Despite our best efforts through our contacts we could not get female investigators in Mainpuri district. We decided to replace the district by Etawah. In Tehri Garhwal we could not find the female investegators from each of the selected blocks. However, we succeeded in persuading a group of post-graduate female students of the university to work in the three blocks.

The local investigators were given training for a period of one week to ten days and then placed under the supervisors. The Supervisors, established contacts with the influential persons of the selected villages. The household survey was, then, conducted under the constant supervision of the Supervisor.

Since a supervisor was a look after the survey of the two/ three blocks of the district he used to check a selected number of completed schedules randomly. This helped us in maintaining the rliability of the interviews and the sample. In two districts, i.e., Banda and Tehri Garhwal, a number of interview schedules were cancelled and the sample households reinterviewed. In one village of district Banda the entire lot of completed schedules was rejected after the supervisor suspected that the sampling procedure was not adopted by the investigators. The village was resurveyed. In Tehri Garhwal four villages were resurveyed after the coordinator, found the checkning of the completed scheduled was not done properly by the supervisor. They also suspected inaccuracieds in sampling. The supervisor for this district was also replaced and a number of investigators were dropped. Thus, precautions were taken for maintaining the relia- bility of the data. For this purpose, the field operations were kept under constant check. All the completed schedules were checked by the data checkers and coordinators. A sample of them was also checked by the Project Director. The supervisors were constantly given feed back about the quality of the interviews. The Project Director also visited the selected districts during the period of training of investigators and survey. After obser- ving the field work in each of the districts he used to issue general instrutions to all the supervisors so that the inaccuracies/ discripancies observed in one district are avoided in other.

SUMMARY AND CONCLUSIONS

The present study is based on the survey of two population groups of the state of Uttar Pradesh, namely, Rural and Hilly. In the Rural population group the survey was conducted in five districts, namely, Basti, Sultanpur, Etawah, Rae Bareli and Banda representing the eastern, western, central and Bundelkhand regions of the state. In the Hilly group, three districts, namely, Almora, Pithoragarh and Tehri Garhwal were selected. The study is based on the survey of 11,419 households in the Rural and 8,572 households in the Hilly groups. The survey was conducted in 86 villages in the Rural and 112 villages in the Hilly areas. The field work for the study was conducted in between January and June 1987. On the basis of the present survey we found the IMR (Infant Mortality Rate) in the Rural area was 213.9 (218.93 for males, 208.04 for females) and in the Hilly area 141.3 (141.41 for males, 141.05 for females). In the Rural sample, district Etawah had the lowest IMR (85.71) followed by Banda (179.31), Basti (187.25), Rae Bareli (258.99) and Sultanpur (295.70). In the Hilly districts, Almora had a significantly low IMR (61.54) followed by Tehri Garhwal (184.08) and Pithoragarh (189.62).

On the basis of the SRS data from the Registrar General of India, the Directorate of Family Welfare, Uttar Pradesh (1987) reported that the Infant Mortality Rate in U.P. during 1985 was 140 as against 95 in the country. The present survey of the eight districts covering Hilly and plains of the state indicate that the IMR for the combined population of the two areas was 191.22 (194.2 for males and 187.65 for females).

A significantly higher IMR was found in the Rural Population Group (213.92) as compared to the IMR in the Hilly group (141.25). The data also indicated:

(a) a higher IMR among male as compared to the female children in the Rural Group while it was almost equal in the Hilly

groups;

(b)   mortality rate at the Post Neo-natal stage was higher than
      at the Neo-natal stage, in both the population groups;

(c)   mortality rate among female children was significantly
      lower than males at the Neo-natal stage but it exceeded
      the mortality rate among males at the Post Neo-natal stage;
      and

(d)   mortality rate among the toddlers was very low as compared
      to the mortality rate among infants and in the two population
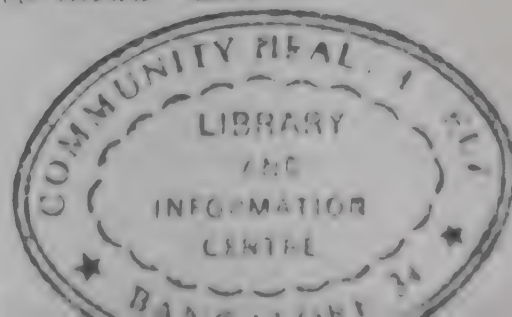   groups it was higher in the Rural group as compared to the
      Hilly group.

In the Rural Population Group, the highest Infant Mortality
Rate was found in one of the two districts from the Eastern region
of the stage namely Sultanpur (295.70) followed by Rae Bareli
(258.99) of the Central, Basti (187.25) in the Eastern, Banda
(179.31) in the Bundelkhand and Etawah (85.71) in the Western
region.

In the Hilly Population Group the highest IMR was found in
district Pithoragarh (189.62) followed by Tehri Garhwal (184.08)
and Almora (61.54).

Thus, the present study indicate a high Infant Mortality Rate,
particularly in the Rural Population Group. Comparing with the
SRS data we find a very high IMR in four out of the five districts
of the plains and two out of the three districts of the Hill
region of Uttar Pradesh.

(A)   Critical Factors
The study examined the contribution of a number of risk or
causative factors to infant mortality. The risk factors included
in the study were considered critical at the Pre-natal, Natal,
Post-natal stages. Besides, socio-economic risk factors and

fertility behaviour were also examined.

(i) Pre-natal Risk Factors

Under this category the relationship between certain natural attributes and infant mortality was analysed. The highest IMR was recorded when mother's age at child birth was upto 18 years (281.8 in Rural and 163.6 in Hilly) while it was lowest when mothers were in between 19 and 25 years (Rural 194.6 and Hilly 123.9). The IMR increased sharply when mother's age at child birth was in between 26-35 years (Rural 225.3 and Hilly 165.4).

The relationship between birth order and infant mortality and between preceding birth interval and infant mortality indicate that in the Rural Group the IMR was lowest at second-order births (149.7) which increased to 241.7 and 243.2 at the third and fourth order births. The IMR was lowest (167.6) when the preceding birth interval was above 36 months and highest (247.9) when the interval was upto 24 months.

In the Hilly group, however, the lowest IMR was found at the first order births (105.0) which consistently increased to 210.5 at the fifth order births. The lowest IMR was found when the preceding birth interval was only upto 24 months (108.5).

The IMR seems to have a positive relationship with complications experienced by mothers during their pregnancy period. In such cases, the IMR was very high in the Hilly Group (571.4) as compared to the Rural group (246.9). Most of such deaths have reported in the Neo-natal stage. The incomplete term of pregnancy was also found related to a higher IMR, more significantly in the Rural Group (486.7) than in the Hilly Group (168.1). A very high IMR was recorded when mothers had experienced previous pregnancy losses. In such cases, the IMR was found very high in the Hilly Group (567.9) than in the Rural Group (271.3).

The relationship between a number of diseases the mothers suffered from during the index pregnancy and infant mortality was also examined. It was found that in the Rural Population Group the mothers who suffered from Hypertension had reported a very high mortality rate (833.3) among their infants as against those who did not suffer from this ailment (211.5) followed by Heart diseases (384.6 as against 213.2 in case mothers did not suffer), Oedema (365.5 and 206.6), Accident/injury (359.0 and 202.2), Convulsions (325.7 and 207.3), Diabetes (304.4 and 213.3), Malaria (283.0 and 211.5), Anemia (258.1 and 213.0), Palour (256.4 and 184.4), Tuberculosis (235.29 and 213.69) and Renal infection (230.8 and 213.7 respectively).

In the Hilly Population Group the relationship between mother's ailments during the index pregnancy and infant mortality shows that all the children died during their infancy if their mothers suffered from Renal infection. The IMR was 666.7 if mothers suffered from Oedema while it was 133.6 in case the mothers did not suffer from this disease. The IMR was 234.0 in case mothers suffered from Anemia as against 137.1 if they did not suffer while the IMR was 228.6 in case mothers suffered from Convulsions (135.7 if did not); 220.2 in case of Malaria (125.9 if did not); 196.3 in case of German Measles (135.8 if did not); 173.6 in case of accident/injury (137.2 if did not); and, 145.4 in case mothers suffered from Palour (131.6 if did not suffer).

Comparing the effect of certain ailments during pregnancy we find that :

(a) some ailments of mothers during the index pregnancy had no significantly adverse effect on the survival of children. For example, German Measles did not show any significant impact on IMR in the Rural and Heart disease, Tuberculosis, Diabetes and Hypertension in the Hilly Population Group; and

(b) In the Rural Population Group the mother's ailments such as
     Oedema, Heart diseases, Hypertension and Anemia were found
     associated with a higher IMR at the Neo-natal stage while
     Palour, Convulsions, Malaria, Tuberculosis, Diabetes and
     injury were related with a higher IMR at the post Neo-natal
     stage.

     In the Hilly Group, mothers' ailments during the index
pregnancy such as Malaria and accident/injury were found associated
with a higher IMR at the Neo-natal and Renal infection, Oedema,
Anemia, Convulsions, German Measles and Palour at the post
Neo-natal stage.

     With regard to the effect of the anti-natal care received
by mothers during the index pregnancy on infant mortality we find
a very positive result when timely special contacts were
established with health workers. In both the Rural and Hilly
Population Groups the IMR remained low when, during certain
complications/problems, contacts were established with Health
Guide (128.7 and 111.1), ANM/Nurse (150.0 and 114.0), Health
Visitor (94.3 and 73.2) or a Government Doctor (174.6 and 99.0).
The full course of three doses of Tetanus toxide injections and
Iron tablets were associated with a low IMR in both the Rural
(160.2 and 164.2) and Hilly (111.7 and 123.5) population groups.

     The normal dietary intake of cereals, pulses, fat/oil, eggs
and meat/fish by mothers in the rural group and that of cereals,
pulses and leafy and other vegetables, milk, fat/oil, sugar/jaggery,
eggs, and meat/fish in the Hilly Population group during pregnancy
was associated with a low IMR. A low IMR was found if mothers
during pregnancy, in the Rural Population Group, maintained normal
diet (214.6) and did not avoid any food (212.8). In comparison,
the IMR was higher if mothers took extra food (225.0) and
avoid certain food (246.9). In the Hilly Group the IMR was low
(137.9) if mothers did not take extra food during pregnancy as

against those who used to take extra food (250.0). However, in
this population group the IMR was low if mothers did avoid certain
food (132.7) than those who did not (140.4). This might be due to
the climatic conditions that certain food items are avoided in the
Hilly areas during pregnancy.

The addictive personal habits of mothers during the index
pregnancy seems to have had serious impact on the health of children.
The infant mortality rate was higher in such cases, in both the
Rural as well as Hilly Population Groups. Even toddler mortality
was found significantly high if mothers had the habit of smoking/
chewing tobacco during pregnancy. Loss of weight of mothers during
pregnancy also indicate a significant relationship with a high
IMR in both the Rural (358.6) and Hilly (374.1) groups. In such
cases mortality rate among the toddler group was also higher in
both the Rural (59.8) and Hilly (59.7) population.

(ii) Natal Risk Factors

These factors related to the conditions of labour and delivery.
We find a higher IMR in case of caesarian delivery (Rural 300.8
and Hilly 203.9); delivery in a hospital (Rural 238.1 and Hilly
221.2) than at the home (Rural 212.6 and Hilly 133.3); excessive
bleeding before the on-set of labour (Rural 246.5 and Hilly
253.0) or after delivery (Rural 259.0 and Hilly 291.5).

Surprisingly, a very high IMR was found in the Rural group
(317.1) when the birth was attended by a government doctor or by
a private doctor (235.3) or by a trained Dai (226.5). In the
Hilly group, the highest IMR was found when the birth was
attended by 'none' (267.6) or when it was attended by a government
doctor (212.1).

The smaller than usual size of the baby at birth was found
related to a very high IMR in both the Rural (392.4) and Hilly
(344.0) population groups.

Some of the problems/complications experienced by children
at birth proved a serious risk to their lives. Infant Mortality was
found particularly very high in the Rural group when children
suffered from : Cord infection (344.3), Birth injury (342.9),
Pre-maturity (482.4), low weight (409.7), cynosis (377.4), Icterus
(311.5), Convulsions (490.9), Respiratory distress (354.2),
Malformation (428.6), Abdominal distension (252.5) and other
illness (529.4).

In the Hilly Population Group the IMR was found very high
when the infants suffered from cord infection (500.0), Birth injury
(200.0), Prematurity (263.2), Low weight (254.9), Convulsions
(225.8), Respiratory distress (333.3), Poor feeding (205.5),
Abdominal distension (302.3) and other unidentified illness (1000.0)

(iii) Post-Natal Risk Factors

The post-natal risks for the new born babies start from feeding
stage. The highest Infant Mortality Rate, in both Rural and Hilly
groups, was recorded when no pre-lacteal feed were given to the baby
before breast milk (Rural 397.1 and Hilly 417.7). This proved much
more fatal to the babies in the Neo-natal stage (Rural 338.2 and
Hilly 324.9).

A very high mortality rate was found among the infants who did
not receive breast feeding (Rural 635.8 and Hilly 549.1) at all.
The effect of this aspect of feeding was found very serious at the
Neo-natal stage as the mortality rate in this category of infants
was 592.6 in the Rural and 462.4 in the Hilly Population Group.
The trend of the data indicate lower IMR in case children were breast
fed for a longer duration. This possibly indicate the breast
feeding for longer duration protects children against various
infections through supplementary food. However, supplementary food
at appropriate age is also essential for the healthy growth of
children and, therefore, the late introduction of such foods was
found associated with a higher IMR.

Immunisation of the infants against certain serious diseases had a very positive effect on their survival. The IMR among the infants who had BCG dose (Rural 141.5 and Hilly 14.4), three doses of Polio (Rural 58.8 and Hilly 0.0) and DPT/Tripple Antegin Vaccines (Rural 20.0 and Hilly 14.1) was very low as compared to those who did not have any doses of BCG (Rural 225.3 and Hilly 163.1), Polio (Rural 236.5 and Hilly 150.0) or DPT/Tripple Antegin (Rural 227.8 and Hilly 151.5) vaccines. Maintaining routine contacts or establishing special purpose contacts with different levels of health personnel for post-natal care of the child has been found associated with a significantly low IMR.

The general health conditions of children during the first and second six months of their lives had a serious bearing on mortality rates among infants and toddlers. In case of the general health conditions below normal during the first six months the IMR in the Rural group was 525.4 and in the Hilly 392.9 while in case of above normal the IMR was 350.8 in the Rural and 457.1 in the Hilly Population Group. The IMR was found 449.7 in the Rural and 200.0 in the Hilly group if the conditions of general health of infants during the 7th and 12th months were below normal while in case of above normal health conditions the IMR in the Rural group was 258.1 and in the Hilly group 173.2.

Over half of the children (58.5 per cent) born in the sample Rural and 18.36 in the Hilly areas suffered from one or the other serious illness such as various types of fevers, coughs, digestive and nervous disorders, circulatory ailments and other (including Jaundice, tetanus, measles, diabetis, malnutrition, accidnet/ injury). The highest IMR was found among those who suffered from the ailments under the category of others (Rural 583.5 and Hilly 563.6) followed by circulatory ailments in the Rural (408.2) and Nervous disorders in the Hilly (428.6) group. The IMR among those in the Rural Group who suffered from coughs (361.3) and Nervous disorders (319.2) was also very high. In the Hill group the IMR

was also significantly higher among the children who suffered from coughs (360.0), circulatory ailments (285.7), fevers (222.8) and digestive disorders (210.1). The mortality rate among the toddler group who suffered from circulatory (98.0) and other (97.5) ailments in the Rural population was also found significantly high. Gain in weight, either below or above normal, during the first year of the child's age has been found associated with very high IMR in both the population groups.

The effect of malnutrition on mortality among infants and toddlers was found very serious in both the rural and hilly population groups. The effect of this deficiency was highly serious on children in the post neo-natal stage. Mortality among toddlers was also found significantly high. The highest IMR in the Rural group was found in case children had swelling on face and feet (511.6) followed by an IMR 492.3 in case of absence of muscles under skin, 481.8 if they developed Pale skin/mucus membrane, 471.1 if discolouration/loss of hair, 426.5 if breading of ribs and 247.5 if frequent colds and infections occured. In the Hilly group the highest IMR was found if children suffered from absence of muscles under skin (333.3) followed by 300.0 in case of breading of ribs, 272.7 in case of swelling on feet and face, 225.8 in case of pale skin/mucus membrane, 156.0 in case of frequent colds and infections and 150.4 in case of discolouration/loss of hair.

The data on the role of mass media does not indicate its effectiveness in reducing the IMR by providing useful information to the population on usual health problems of children.

(iv) Socio-Economic Risk Factors

A majority of the currently married women in the sample households (68.29 per cent) of the Rural population group were married at the early age of upto 15 years as against only 17.16 per cent of women in the Hilly group. More than half of the women in the Hilly group (55.71 per cent) were married in between

16-18 years as against 23.22 per cent of women in the Rural group. Literacy in the Rural population group was also significantly lower in comparison to the Hilly group as the percentage of illiterates, among males (55.33) and females (73.72) was much higher as compared to the Hilly group (Males 31.51 and Female 57.10). The percentage of persons educated at the 'matric and above' level in the Hilly group (Males 21.17 and Females 5.37) was significantly higher than in the Rural group (Males 9.51, Females 2.96).

The trend with regard to the relationship between parents education and infant mortality indicate a higher IMR if neither of the parents were educated (Rural 234.6, Hilly 156.5). In comparison, the IMR in the Rural group was 183.04 and in the Hilly group 154.69 if both the parents were educated.

The families with larger number of children had lower IMR than the families with smaller number of children. For example, the IMR in the families with upto two children was 332.04 in the Rural group as against 155.79 if the number of children exceeded two. Similarly in the Hilly population group the IMR in the families with upto two children was 171.0 as aginst 123.16 where the number of children was more than two. This possibly indicate that the smaller number of children in the families was the result of higher mortality among infants.

There was an indication that the presence of elderly persons (parents/grand parents) in the family was associated with a lower IMR (Rural 207.2 and Hilly 140.6). The households where there were no elderly persons the IMR was 218.31 in the Rural and 141.40 in the Hilly groups.

In the sample households, Hindus in the Rural (218.8) and Christians in the Hilly (500.0) group had highest IMR. The Scheduled Caste in Rural (231.6) and the Scheduled Tribes in the Hilly group (200.0) had the highest IMR as compared to 'other' castes (Rural 208.5 and Hilly 138.6).

The relationship between the size of agricultural landholdings and IMR indicate that the infant mortality was highest in the families of big farmers in the Rural (250.0) and small farmers (200.0) in the Hilly group. In comparison, families of the small farmers in the Rural (192.4) and that of the marginal farmers in the Hilly (120.0) group had the lowest IMR. Thus, the relationship between the two variables suggest that the size of agricultural landholding had no significant bearing on the infant mortality.

The ownership of milch cattle and poultry birds have shown a negative relationship with infant mortality in both the Rural and Hilly groups. The household without them had the highest IMR. The IMR was 240.92 in the rural and 159.89 in the Hilly if the households had no milch cattle as against 204.78 in the Rural and 118.72 in the Hilly group if they had more than two animals. The IMR in the families without poultry birds was 215.06 in the Rural and 147.39 in the Hilly while it was 184.21 in Rural and 80.0 in the Hilly group if they had more than five birds. It seems the possession of milch cattle and poultry birds was probably helping more in maintaining health of members of the household than supplementing their income. This is substantiated from the analysis of data on IMR in relation to ownership of a kitchen garden where we did not find any positive effect of a kitchen garden on the IMR.

Some of the conditions of housing indicate their adverse effect on the survival of infants. We find a common trend of highest IMR, in both the Rural and Hilly population groups, in case the families were residing in kutcha houses (Rural 220.8 and Hilly 302.9), with insufficient ventilation (Rural 232.0 and Hilly 191.8), severe smoke inside their dwellings (Rural 285.7 and Hilly 220.1), open latrine (Rural 220.5 and Hilly 141.8), and place of garbage disposal near their houses (Rural 228.4 and Hilly 147.1).

The most important and direct indicator of the economic and social status of a family is the income it derives through different sources. We find the families of artisans in the Rural Group (277.8) and of the wage labour in the Hilly group (165.5) had the highest IMR, while those earning through business in both the Rural (103.5) and the Hilly groups (74.6) had the lowest IMR. The highest IMR among the artisan families in the Rural and wage labour in the Hilly groups may possibly due to employment of women in these occupations. It was probably due to this characteristics that mortality rate at the post Neo-natal stage was found much higher than at the Neo-natal stage.

The families with lowest monthly earnings of upto Rs.500/- had the highest Infant Mortality Rate (Rural 255.8 and Hilly 222.8). Similar was the trend in relation to the monthly household expenditure in the Rural group where the IMR was 258.45 in the families spending upto Rs.500/- per month. However, in the Hilly group the highest IMR (205.88) was found in the families spending between Rs.1001 - 2000 per month. The relationship between monthly household expenditure and infant mortality in the Hilly group, therefore, does not correspond to the pattern of IMR found in relation to the monthly household income.

(v) Fertility Behaviour

The relationship between infant mortality and the fertility behaviour of the sample population was also examined. We find a higher IMR when mothers became pregnant after the birth of the index child (Rural 237.7 and Hilly 258.4) then among those who did not (Rural 211.5, Hilly 133.6). Those who felt it necessary to have a child in place of the one that dies within a year of life were associated with a higher IMR (Rural 265.9, Hilly 160.5) than those who did not think so (Rural 186.4 and Hilly 126.5). The responses of those who did not prefer any method of family planning were associated with the highest IMR (Rural 222.2 and Hilly 176.5)

than those who expressed preference for one or the other methods.
The desire for having just one child in the family was found
associated with the lowest IMR in both the Rural (73.2) and the
Hilly (116.3) groups while that for two in the Rural (245.9) and
for three in the Hilly group (152.3) were found associated with
the highest IMR. In the Rural group, in order to ensure that the
desired number of children should survive, those who considered
it necessary to have more children, had experienced a significantly
higher infant mortality in their families (258.7) than those who
did not consider it necessary (169.8). In the Hilly population
group, however, there were no significant differences in respect
of the relationship between infant mortality and the desire for a
larger number of children.

(B) Implications

Infant Mortality is the result of a number of factors. Some
of them can be identified as high risk factors while others may be
supplementing different factors and enhancing the risks. In the
first category the risks are independent while in the other are
collaborative. According to the present study the largest state
of the country, i.e. Uttar Pradesh has an Infant Mortality Rate
of 191.2 (213.9 in Rural and 141.3 in the Hilly areas). Some of the
risk factors in the state are likely to be different from other
areas of the country. Most important of them are the conditions
of over-all development in the state; the extent of availability
of the infrastructure; and, the level of fertility.

The poor economic and environmental conditions, the awareness
about the facilities available for taking precautionery and
remedial measures and the desire in the population to avail them
at appropriate stage are also significant factors in reducing or
enhancing the risk of infant mortality. The incidence of infant
mortality may, therefore, be viewed as the outcome of a complex
combination of factors such as biological, environmental, economic,
social and cultural.

The present study covered 20,880 households in 154 villages/ clusters of 19 blocks of eight districts of the state. From amongst these families 5,409 mothers were interviewed for an indepth analysis of the risk factors related to infant mortality. They included the factors:

(a) connected with experience of earlier reproductive life;
(b) affecting risk at the time of conception; (c) affecting risk at the time of growth and development of foetus during gestation period; (d) affecting risk at the time of delivery of baby; and (e) affecting risk at the time of growth and development of the infant. Thus, the study covered every aspect related to the incidence of infant mortality.

The findings of the study have significant practical as well as policy implications. Briefly we mention the following :

(a)   The IMR was lowest in the comparatively developed districts
      i.e. Etawah in the Western region and Almora in the Hilly.
      Taking a clue from this, we believe the over-all development
      of the area will reduce the IMR as in such a case the literacy
      rate will increase, the appropriate infrastructure including
      the health and MCH services will improve. This will help in
      taking precautionery and remedial measures in cases of such
      maternal ailments/complications during the period of pregnancy
      which proves fatal for the infant. Besides, a number of fatal
      diseases among the infants can be checked at the appropriate
      time.

      The availability of sufficient medical and health facilities
      within reach of the population will automatically generate
      among the people the desire to avail them.

(b)   The mass media has not proved itself effective in educating
      the population even about the usual health problems of
      children. The establishment of an appropriate number of the
      MCH centres with the responsibility of mass contacts may

help in creating awareness among the people, about the need
of such precautions as:

(i)   the first delivery should not take place before
        the women attain the age of 19 years;

(ii)   the interval between two births should be about
        36 months;

(iii)   maintaining routine contacts with the hospital and
        immediate check-up and proper treatment in case of
        complications during pregnancy; and,

(iv)   normal dietary intake and avoidance of addictive
        personal habits during the period of pregnancy.

The study has found that the IMR was lowest if the above
mentioned conditions were maintained. There is also a
great need of providing appropriate facilities for treatment
of certain fatal diseases of the new-born babies at these
centres.

(c)   Malnutrition among the pregnant mothers and the infants had
      a serious adverse effect on the survival of children. The
      programme of distribution of nutritional food among the
      economically weaker group has to be expanded and properly
      maintained.

(d)   The MCH centres may also play a significant role in educating
      the people about the consequences of their fertility
      behaviour, desiring for a large number of children and the
      necessity of breast feeding for a sufficient period.

(e)   The immunisation of infants should be augmented and the
      people should be made aware of its necessity.

(f)   There is a great need of implementing the law pertaining
      to the age at marriage as a large majority of women in the
      Rural group were married at the age of upto 15 years and
      in the Hilly group at the age of upto 18 years.

(g) A massive programme of public education will help in reducing
     the IMR if the people are made aware of the necessity of:

  (i)   appropriate age at marriage, sufficient gap between
         two births and having a small number of children who
         can be properly brought-up,

  (ii)   literacy among males and females both,

  (iii) keeping their houses clean, properly ventilated,
         avoiding indoor smoke if they don't have a separate
         kitchen, and disposing of the garbage in the open
         space, away from their houses.

  (iv)   maintaining the area in their neighbourhood clean
         and insects-free.

(C) Suggestions

The present study covered such a large size of sample which
no other study had covered earlier. The findings, therefore, were
more significant as they are based on the responses of people
belonging to all regions of the state representing about 82 per cent
of the total population.

In the light of the above it is desirable to conduct an action
research in a longer span of time. This may be taken up by adopting
one of the weakest blocks from the Hilly and the Rural areas each.
The risk factors identified through the present study may be
checked by improving the existing conditions in over a period of
atleast three years. From the second year of introducing of these
changes the conditions of infant mortality should be studied, in
relation to the risk factors identified in the present study.
Such a study will provide us an opportunity to test (a) whether
the identified risk factors were independent as their elimination/
minimization would reduce the IMR considerably; and, (b) whether
in the absence of these risk factors some relatively insignificant
factors become significant or some new ones crop-up to increase
the IMR.